MISCELLANEOUS 3

Mayer David

From: Cindy A. Obringer[SMTP:Cindy.Obringer@wl.wpafb.af.mil]
Sent: Thursday, May 15, 1997 5:02 PM
To: Mayer David; Swaim Bob; STEVEN GERKEN; MICHAEL MANDERS
Subject: Wright Laboratory Meeting Participants

The following people from Wright Laboratory will be attending the May 29 meeting.

Steve Gerken
Electro Static Discharge
Materials Directorate
Wright Laboratory
[redacted] (b)(6)

Mike Manders
Electro Static Discharge
Materials Directorate
Wright Laboratory
[redacted] (b)(6)

Dexter Kalt
Fuels Engineer
University of Dayton Research Institute
[redacted] (b)(6)

Marlin Vangsness
Physicist
University of Dayton Research Institute
[redacted] (b)(6)

Cindy Obringer
Fuels Engineer
Aero Propulsion and Power Directorate
Wright Laboratory
[redacted] (b)(6)

The following two people would also like to attend if room permits. Both would be beneficial to have if possible.

Bill Harrison
Branch Chief
Fuels Branch
Aero Propulsion and Power Directorate
Wright Laboratory
[redacted] (b)(6)

George Slenski
Group Leader
Failure Analysis
Materials Directorate
Wright Laboratory
[redacted] (b)(6)

(b)(6)

To Jay Arkuszeski [redacted]

From John D King 12/26/97

Dear Jay:

I noticed your earlier query to Jim Bergquist regarding TWA 800 and the NTSB. Perhaps you may find the following interesting. Any of the following documents mentioned can be faxed, in their entirety, at any time. Call collect at [redacted]

WHAT THE FAA KNOWS ABOUT AGING WIRE

Dec 19,1997. By John D. King, (tel. [redacted].

With the NTSB's TWA 800 week long hearing behind us now the public is left the disturbing news that aging aircraft not only suffer from corroded airframes but aged wires as well. Many now await the FAA's promised June 1998 response as they claimed to be surprised by this phenomena. The NTSB's wire panel expert, George Slenski cast the most light of this and its clear from his posted exhibits; "Causes Of Aircraft Electrical Wiring" and "Development And Analysis Of Insulation Constructions For Aerospace Wiring Applications" (NTSB Exhibit 9C, page references 000005 through 000033) that he has extensive experience.

In response to a question, Mr. Slenski also acknowledged the work of other industry colleagues; FAA's Patricia L. Cahill was one. As with Mr. Slenski's exhibits written in the early 90s, Ms. Cahill's work PREDATES this hearing even further, by about 5 years.

Ms. Cahill's reports are even more descriptive than Mr.Slenski's; so much so, I wonder that since she is an FAA employee, will the FAA be including her reports as they prepare for that next June report? I appreciate what the FAA has already done and has already known for some time, excerpts of three of Ms. Cahill's reports follow:

REPORT NO. DOT/FAA/CT-88-4
AIRCRAFT ELECTRICAL WET-WIRE ARC TRACKING
Author, Patricia L. Cahill and James Dailey

August 1988

Final Report 21 pages, Sponsoring Agency, FAA Tech Center, Atlantic City, N.J.

Abstract

Electrical wet-wire arc tracking is a phenomenon that has been known for many years. This can occur when leakage currents on a wet insulation surface are great enough to vaporize the moisture, resulting in the formation of dry spots. These dry spots offer a high amount of resistance to current flow. In turn, an induced voltage will develop across these spots and result in the occurrence of small surface discharges. Initially, these discharges will appear as scintillations at the insulation surface. These discharges produce highly localized temperatures on the order of 1000 degrees Centigrade. Temperatures of this magnitude will cause thermal degradation of the insulation material, the nature of which depends on the insulation material.

The Federal Aviation Administration (FAA) conducted a series of bench scale tests which demonstrated that the ability of an aircraft wire to resist wet arc tracking and possible flashover is highly dependent on the composition of

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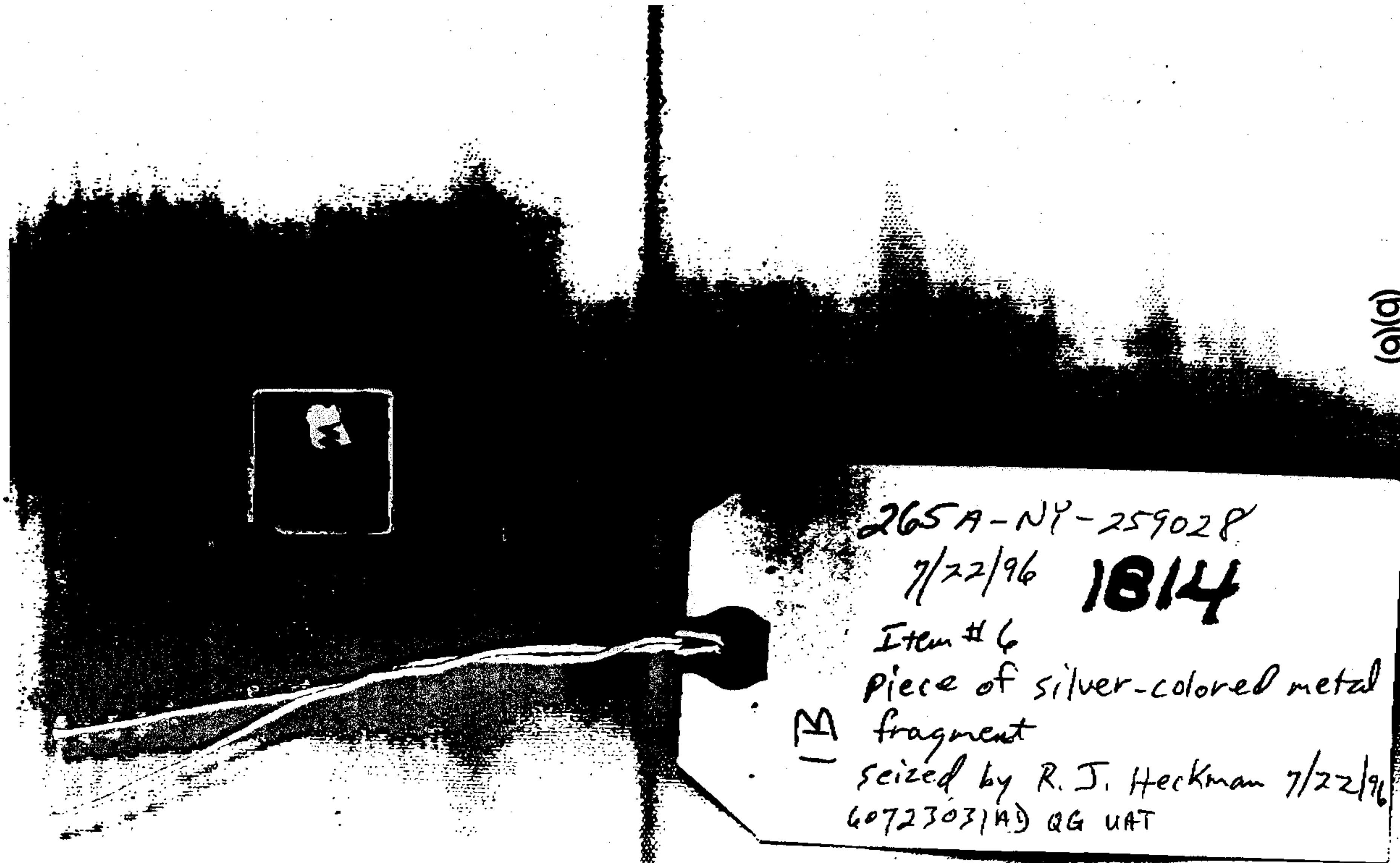

tag stapled to front of plastic bag
and one side of little sample box

W. Harvey Gray, Director [e-mail] whg@ornl.gov
Computational Center for Industrial Innovation
Oak Ridge National Laboratory [voice] (423)241-2863
Building 4500N [fax] (423)241-6649
Mail Stop 6203
Oak Ridge, TN 37831-6148
[URL] http://www.ccs.ornl.gov/ccii

[redacted]

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[redacted]

Thomas Zacharia, Ph.D. Group Leader Modelling & Simulation group
Oak Ridge National Laboratory email: zac@ornl.gov
P.O. Box 2008, MS-6140 phone: (423) 574-4897
Oak Ridge, TN 37831-6140 fax : (423) 574-4839
Bldg 4500S
lh

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[redacted]

(b)(5)

Joseph E. Shepherd
Associate Professor of Aeronautics
Graduate Aeronautical Laboratories
MS 105-50
California Institute of Technology
Pasadena, CA 91125 USA
1200 East California Blvd

TEL [redacted]
FAX [redacted]
E-mail [redacted]
WWW http://www.galcit.caltech.edu

[redacted]

Dr. Jerrold M. Housner's correct mailing address is:
NASA Langley Research Center
Attn: Dr. Jerrold M. Housner
Mail Stop 240
3 Langley Boulevard
Hampton, VA 23681-0001

If you have any further questions or need further assistance, please
me a call.

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(b)(5)

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[redacted]

[redacted]

[redacted]

Edward J. Saade: Mr. Saade was the SAIC Program Manager and Site Manager for the Laser Line Scan System support effort on the TWA-800 investigation. He has been the SAIC LLS system manager since 1992 and has been directly involved in all LLS operations worldwide for SAIC's DDS Division. He splits his time as Division Manager for the Newport, RI office and Program Management duties for the DDS Division in San Diego, CA. He has a bachelors degree in geology from the University California Santa Barbara, graduate studies and research in marine geophysics from the University of Hawaii, and is a California Registered Geophysicist (GP #928). www.saic.com

[redacted] (b)(6)

Dr. Drew Carey: Dr. Drew Carey has worked for SAIC for five years, the last two as the Newport site manager for the Marine Environmental Science Division. He is the Program Manager of the Disposal Area Monitoring System (DAMOS) for the U.S. Army Corps of Engineers and has directed laser line scan surveys for marine environmental assessment throughout New England. He has a bachelor's degree in biological oceanography and geology from the Evergreen State College and a doctorate in marine ecology and geology from the University of St. Andrews, Scotland.

Laser Line Scan System Operations During the TWA Flight 800 Search Effort

Teamwork between companies and personnel is the key to the successful and highly beneficial use of the system to aid investigators in determining the cause of the crash

During the initial days following the crash of TWA Flight 800, investigators and salvage personnel from the US Navy quickly determined that the recovery effort could be difficult and tedious. The general crash site was in 110ft of water, located approximately 9-10 miles off central Long Island, New York. As the search and salvage effort developed, the boundaries of the debris field began to exceed 5-square miles with dozens of isolated potential targets being discovered daily on the continuously operating side scan sonar systems. Small boat, individual dive teams were the only effective means of investigating and salvaging these potential pieces of aircraft wreckage. However, the dive teams were restricted by 15 minutes of bottom time and usually less than 15 feet of clear visibility.

OCEANEERING Technologies, Inc.(OTI), of Upper Marlboro, Maryland, the contractor for the US Navy Supervisor of Salvage (SupSalv), determined that a Laser Line Scan would be of benefit to expediting the diver salvage process. Science Applications International Corporation (SAIC) owns a complete Laser Line Scan System, based on the Northrop-Grumman (Oceanic Systems Unit) SM-2000 Laser Line Scan pressure vessel and topside Control Console. In order to meet the rapid mobilization requirements for SupSalv's operational scheduling, OTI, SAIC and Northrop-Grumman immediately established a teamwork approach. The loadout of the contracted vessel, M/V Diane G, was completed in less than 24-hrs dockside in Newport, with the system generating definitive, panoramic images of wreckage 12-hrs later at the worksite.

The system immediately had an impact on the search effort. The complete search system included the SAIC tow vehicle with KLEIN M-595 Dual Frequency side scan sonar transducers acoustically tied into a DGPS-based Integrated Navigation System. This allowed the search team to immediately begin precisely locating and definitively identifying both large debris fields and isolated pieces of wreckage. This information would then be documented and printed out using a video image frame-grabber and processor. These still images would then be provided the next work morning to the individual dive boats and dive teams for general prosecution and salvage. This integrated approach allowed the divers to plan for the size and type of known debris to be salvaged, drop precisely onto the location and recover the targeted item for the investigators onshore, all within their bottom time allotment and visibility limitations.

The Fully Integrated Laser Line Scan System

The SAIC Laser Line Scan System deployed during the TWA Flight 800 search effort integrated the following systems: A Northrop-Grumman SM-2000 solid state Laser Line Scan pressure vessel and topside Control Console (this particular unit was provided by Northrop-Grumman, the unit owned by SAIC was simultaneously operating on another project); SAIC tow vehicle; KLEIN M-595 Dual Frequency side scan sonar; ORE Trackpoint II USBL; fully integrated SAIC windows based navigation system with DGPS (Trimble) and Gyro Compass; ODOM Echotrak echo sounder. The mounted side scan sonar transducers functioned as both a search tool and an altimeter for the Line Scanner. Water clarity conditions allowed for an average tow height of 15-feet, generating swath widths of approximately 21-feet. This yielded an imaging resolution of 0.3-inches, and detectability of 0.15 inches, as evidenced by small diameter wires and cables. The system was operational during the entire 16-day deployment. During this period, the tow vehicle was only recovered 4 times: twice for general maintenance, once for weather and once for demobilization, resulting in a total of 24 hours out of 16-days that the system was not in the water collecting data. At one point, the tow vehicle was deployed and collecting data for 8 days straight. This continuous operation of the system provided the following results:

- Even in these poor visibility conditions, the system averaged 300,000sq ft/hr of 100% coverage of the seafloor

- A total of 110,000,000 sq. ft of seafloor was imaged (1920 acres or 3.0 sq. miles) along 750 line miles

- Well over 700 individual targets were identified for diver prosecution, some with multiple pieces of debris designated for recovery

- Imaged and identified items ranged from 1.0 to 400 ft sq. in overall size, including:
  - painted metal
  - chromed metal
  - paper, plastics and cloth
  - wires and hydraulic lines
  - machinery
  - variations in color

Data Processing and CD-ROM Data Base

The urgency and complexity of the search and recovery task required near realtime data processing and cross-referencing system. OTI immediately established a target database based on sonar data and diver reports and began developing charts to support survey planning and recovery operations. This constantly growing database was expanded to include LLS and sonar data from the Diane G and eventually cross-referenced every target, image or recovered item generated by 3 survey vessels, 3 ROV's, 2 U.S. Navy ASR's and the fleet of individual dive vessels.

Images collected with the LLS system were logged on the ship and entered into the SAIC precision navigation and target locator system. Target data files and Super VHS videotapes were conveyed to shore for post-processing by SAIC staff. Each image was digitized with a RasterOps framegrabber in a MacIntosh 850

Quadra and annotated with navigation and date and time. To provide divers with a clear visual reference during recovery operations, individual images were printed in an 8½ x 11" format on a high resolution dye sublimation printer provided by Tektronix. Each image was classified by the authors to assist prioritization of recovery efforts and later cross-referenced with diver reports prior to charting. All data associated with the images was transferred to the OTI target database and entered into AutoCad files for charting.

As the database grew, management and presentation of the data became critical. Many sonar targets overlapped and LLS images could only be viewed from hard copy prints. In two days, SAIC developed and implemented a Geographic Information System (GIS) based information management system that incorporated a customized user interface, OTI's search area chart, verified locations, diver reports and underwater images of 1035 targets on a CD-ROM. The customized user interface was designed to allow investigators, divers and project managers access to complex information without requiring any training in GIS software. A simple point-and-click interface associated data files and image files with each target. As new data was collected, updated CD-ROM's were issued to provide the client with an interactive information management system. The system was based on ArcView software and built upon CD-ROM data management applications routinely used by SAIC environmental scientists for presenting large datasets in GIS format. Environmental Systems Research Institute, Inc. provided runtime versions of ArcView on each CD-ROM to permit platform independence of the management system. As of this writing, the database continues to expand under OTI's direction with daily recovery of debris by divers and logging data on recovered wreckage.

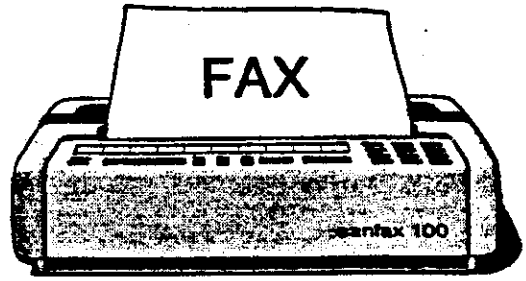
Acknowledgements:

Several 24-hr days were invested by the Laser Line Scan System field team of Gary Davis, Gary Parker, Mike Penno, Paul Selvitelli, Walt Simmons, John Sorois, Mike Sutter, Rich Theisen and Roger Wells, and the data processors Ed D`Angelo and Dave Inglin.

PARTIES TO THE INVESTIGATION: TWA FLIGHT 800
PHONE AND FAX NUMBERS

	COORDINATOR	FAX	OFFICE PHONE	HOME PHONE	OTHER PHONE
ALPA	Jerry Rekart	[redacted]	[redacted]	[redacted]	
BOEING	Dennis Rodrigues	[redacted]	[redacted]	[redacted]	
FAA	Tom Todino	[redacted]	[redacted]	[redacted]	
FBI	Ken Maxwell	[redacted]	[redacted]	[redacted]	
IAM	Fred Liddell	[redacted]	[redacted]	[redacted]	
IFFA	Rocky Miller	[redacted]	[redacted]	[redacted]	
PRATT & WHITNEY	Richard Parker	[redacted]	[redacted]	[redacted]	
TWA	Bob Young	[redacted]	[redacted]		
		(b)(6)	(b)(6)	(b)(6)	

ROH INCORPORATED



(b)(6)

Tom Salmon [redacted]

FACSIMILE TRANSMISSION LETTER

DATE: 3/23/98 ORIGINATOR'S NAME: Judy Kvedar (b)(6)

TIME: 10:00 TELEPHONE NUMBER: [redacted]

NO. PAGES TO FOLLOW: 5

PLEASE DELIVER TO: David Mauer NTSB

MESSAGE:

Following is revised version of Appendix C from Navy SUPSALV TWA Salvage Report.

2611 Jefferson Davis Highway, Suite 700, Arlington, VA 22202
Telephone: [redacted] FAX: [redacted]

(b)(6)

e:\\procedures\Tag Documentation\RF67.doc
OTECH PMG 3/22/97

RF67 Documented as C1674 & C1696

Purpose: To document tags for RF67

Explanation: In the reconstruction mockup, RF67 has one green tag (C1674) attached to the wire bundle. This wire bundle is frimly attached to the fuselage skin that makes up RF67. In the structure notebooks, RF67 is identified with C1696 and C1674 on the first page. Bob Whitington made a sketch of this piece. On this sketch Tag C1696 is clearly seen. [redacted] (b)(5)

The lat/long and FBI Log # for C1674 and C1696 are identical.

ESD List of Attendees

	Able to Attend	Not able to Attend
Mr. Godfrey Baumgartner Lockheed-Martin B/157/4850 1111 Lockheed Way Post Office Box 3504 Sunnyvale, CA 94088 [redacted] (b)(6)	(b)(5)	[redacted]
Mr. Brent Beamer Static Control Components Post Office Box 152 3115 Hal Siler Drive Sanford, NC 27331 (b)(6) [redacted]	[redacted]	
Mr. Steve Casper [redacted] Maintenance Operations, SFOFU United Airlines San Francisco International Airport San Francisco, CA 94128 [redacted] (b)(6)		(b)(5)
Mr. Robert Clodfelter AFP Associates Inc. 6718 Pinewood Place Dayton, OH 45449-1225 [redacted] (b)(6)	[redacted]	
Mr. Mike Collins Federal Aviation Administration	X	
Mr. Ken Craycraft Trans World Airlines(TWA) [redacted] (b)(6)	X	

ESD List of Attendees

	Able to Attend	Not able to Attend
Mr. Joseph Crowley Electostatic Applications 16525 Jackson Oaks Drive Morgan Hill, CA 95037 [redacted] (b)(6)		X
Dr. Keith Davies Marklab M17, Lymington Yacht Haven Kings Saltern Road Lymington, Hants SO 41 9QD United Kingdom/Royaume-Uni [redacted] (b)(6)	[redacted]	X [redacted]
Mr. William G. Dukek Consultant 8 Drum Hill Drive Summit, NJ 07901 [redacted] (b)(6) [redacted] fax	X	(b)(5)
Ms. Kimberly D. Frowein Naval Air Systems Command 1421 Jefferson-Davis Hwy. AIR-53623D Washington, D.C. 20361-5360 [redacted] fax (b)(6)		[redacted]
Mr. Ronald Gibson Celestica, Inc. 844 Don Mills Rd. North York, Ontario Canada M3C 1V7 [redacted] (b)(6)	X	

ESD List of Attendees

	Able to Attend	Not able to Attend
Mr. Charles Hale IAM	X	
Mr. Douglas Hale 19 Denman Avenue Glen Iris, Victoria 3146 Australia [redacted] (b)(6)		X
Dr. Cyrus P. Henry Octel America, Inc, 200 Executive Drive Newark, DE 19702 [redacted] fax (b)(6)	X	
Mr. Lee Johnson ALPA	X	
Dr. Neils Jonassen Technical University of Denmark Physics Dept Bldg. 307 DK 2800 Lyngby, Denmark (b)(6) [redacted]		X
Mr. John Kinnear IBM MS/P355 522 South Road Poughkeepsie, NY 12601-5400 [redacted] (b)(6)	X	
Mr. Joseph T. Leonard Naval Research Laboratory Fuels Branch, Code 6180 Chemistry Division	X	

Washington, D.C. 20375-5000
[redacted] (b)(6)

ESD List of Attendees

	Able to Attend	Not able to Attend
Dr. Edward Matulevicius Exxon Research & Engineering Co. Post Office Box 51 Linden, NJ 07036 [redacted] (b)(6)	X	
Ms. Cindy Obringer 513-255-6390	X	
Mr. Tom Peacock Boeing [redacted] (b)(6)	X	
Mr. Jack S. Smith Lockheed-Martin Advanced Technology Center O/H1-33 B/204 3251 Hanover Street Palo Alto, CA 94304-1187 [redacted] (b)(6)	[redacted]	
Mr. Kurt H. Strauss Consultant 69 Brookside Road Portland, MA 04103 [redacted] (b)(6)		X
Mr. David Swenson 3M/ESD A144-4N-01 6801 Riverplace Blvd. Austin, TX 78726-9000 [redacted] (b)(6)	X	

[redacted] fax (b)(6)

ESD List of Attendees

	Able to Attend	Not able to Attend
Mr. Claude Taucher American Airlines Post Office Box 582809 Tulsa, OK 74158-2809 [redacted] [redacted] fax (b)(6)	X	
Mr. Ronald Tharby Tharby and Associates 273 Juniper Avenue Burlington, Ontario L7L 2T5 Canada [redacted] [redacted] fax (b)(6)		X

TWA 800 EVIDENCE

April 9, 1998

ITEM #	DESCRIPTION	LOCATION
1	Upper surface of wing rib at forward leading edge of right wing. Approx. station 940 -950 (right).	Hangar (Floor)
2	Black Back Pack.	Hangar
3	Gray plastic child's car seat.	Hangar
4	Tan bag (made for York Luggage Corp).	Hangar
5	Fragmented piece of luggage.	Hangar
6	* Fragmented piece of silver colored metal.	Hangar
7	Unidentified white powder.	Hangar
8	Metal fragment with damage.	Hangar
9	One orange insulated wire and one yellow insulated wire.	Hangar
10 (b)(5)	Metal fragments recovered from a seat cushion with a red and blue striped cloth cover. Tag on cover reads "Dry clean only."	Hangar

[redacted]

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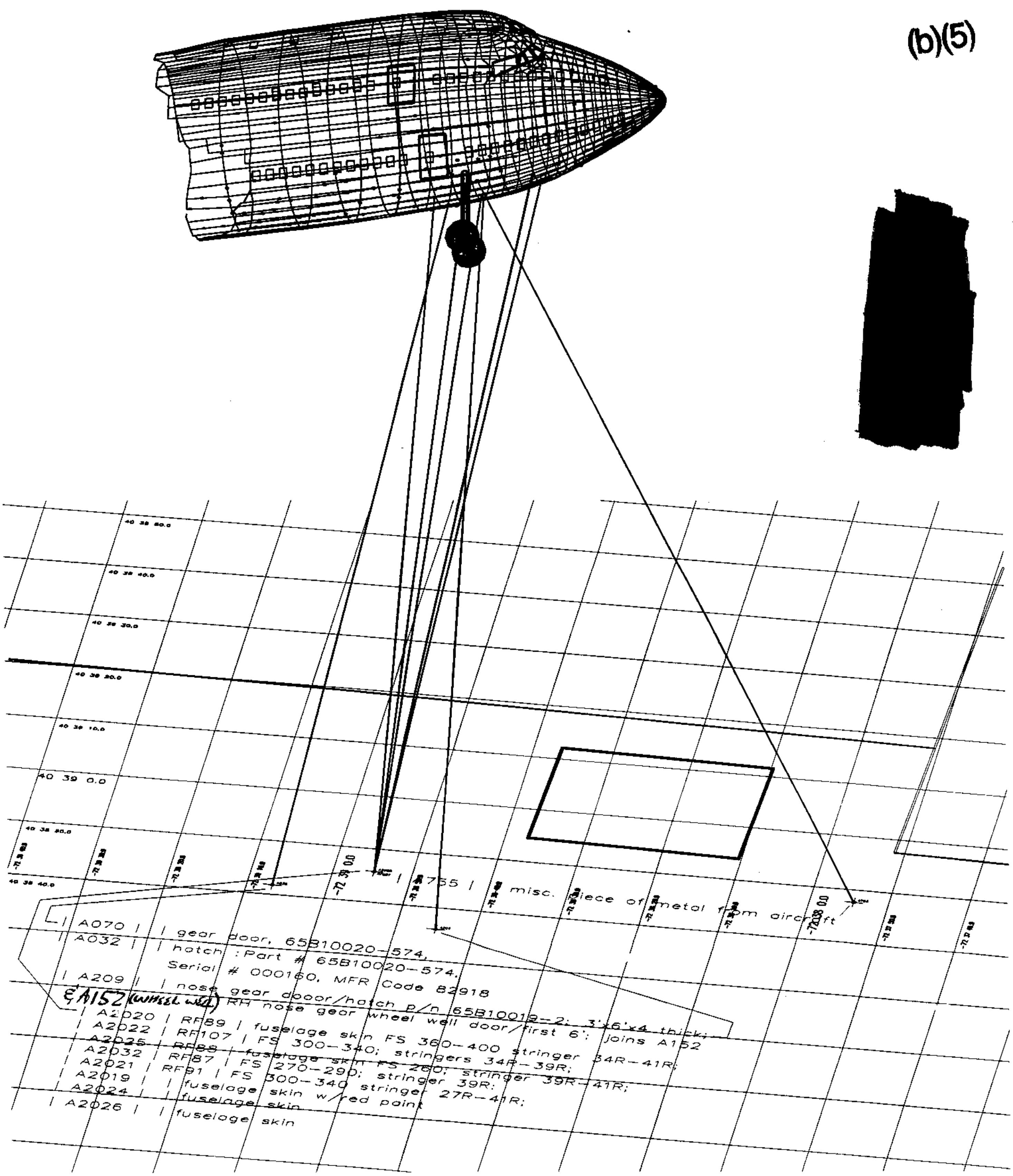
[redacted]



40 39 0.0
-72 39 0.0
| 755 | | misc. piece of metal from aircraft
-72 38 0.0
| A070 | | gear door, 65B10020-574,
| A032 | | hatch :Part # 65B10020-574,
Serial # 000160, MFR Code 82918
| A209 | | nose gear dooor/hatch p/n 65B10019-2; 3'x6'x4 thick;
& A152 (WHEEL WELL) RH nose gear wheel well door/first 6'; joins A152
| A2020 | RF89 | fuselage skin FS 360-400 stringer 34R-41R;
| A2022 | RF107 | FS 300-340; stringers 34R-39R;
| A2025 | RF88 | fuselage skin FS 260; stringer 39R-41R;
| A2032 | RF87 | FS 270-290; stringer 39R;
| A2021 | RF91 | FS 300-340 stringer 27R-41R;
| A2019 | | fuselage skin w/red paint
| A2024 | | fuselage skin
| A2026 | | fuselage skin

arly Tags (b)(5) [redacted]

JAMES D. CASE 4/8/97 [redacted]

ag	Target	Lat	Long	Description	Date
A258	2773-83	72 38 54.22		Blue seat backing	08/07/96
A259	2767.8S	40 38 55.25		3 Seats; Row14, Seats 1,2,3	08/07/96
A260	DIG-65	40 38 31.20		8' alum curved rib 6" wide// 3' heavy alum beam	08/07/96
A261	LLS-344	40 38 31.73		3'x2'cinner light framing, green; 4' piece tubing	08/07/96
A262	126561.1S	40 38 59.90		Part 65B50570-121 p/n 2-3 Order# E330894; 12x1x1 framing	08/07/96
A263	16561.1S	40 38 59.44		Yellow inflatable slide 3A2065-21 on handle/strap*10 knfe cut br riggers	08/07/96
A264	16561.1S	40 38 59.90		Curved white exterior piece 4x4	08/07/96
A265	12688.8P	40 38 50.28		Fuse box galley compley 6'x3"x2"	08/07/96
A266	LLS-316	40 38 33.02		3' strut 1'x'1 green no #'s	08/07/96
B1		40 39 03	-72 38 32	Nose gear	08/01/96
B2		40 39 03	-72 38 32	Nose wheel	08/01/96
B3		40 39 03	-72 38 32	Tension FTG 65B12010-10	08/01/96
B4		40 39 03	-72 38 32	RH wing upper skin plank	08/01/96
B5		40 39 03	-72 38 32	1'x5'x3' rib cargo bin 2	08/01/96
B6		40 39 03	-72 38 32		08/02/96
B7		40 39 03	-72 38 32	RF 3 Cargo door hinge; 2 rollers	08/02/96
B8		40 39 03	-72 38 32	STA 600 3'x3'	08/02/96
B9		40 39 03	-72 38 32		08/02/96
B10		40 39 03	-72 38 32		08/02/96
B11		40 39 03	-72 38 32		08/02/96
B12		40 39 03	-72 38 32		08/02/96
B13		40 39 03	-72 38 32	12"x20" AL exterior skin	08/02/96
B14		40 39 03	-72 38 32	4"x40" beam	08/02/96
B15		40 39 03	-72 38 32		08/02/96
B16		40 39 03	-72 38 32	small 3"x8" sheet structure w/latch arm 2	08/02/96
B17		40 39 03	-72 38 32	Bag support 3" base;EMCO 3 ph motor D2113	08/02/96
B18		40 39 03	-72 38 32		08/02/96
B19		40 39 03	-72 38 32		08/02/96
B20		40 39 03	-72 38 32	Cargo 3"x4"x4" red hook	08/02/96
B21		40 39 03	-72 38 32	western pwr drv scd #60B60006	08/02/96
B22		40 39 03	-72 38 32		08/02/96
B23		40 39 03	-72 38 32		08/02/96
B24		40 39 03	-72 38 32		08/02/96
B25		40 39 03	-72 38 32	contrlld thermst 2BACR158A5AD	08/02/96
B26		40 39 03	-72 38 32		08/02/96
B27		40 39 03	-72 38 32		08/02/96
B28		40 39 03	-72 38 32	513-28-8750; 1"x10"cstng w/eccentrc grvs	08/02/96
B29		40 39 03	-72 38 32	2'x3' crgo strctr w/2-6" rubber wheels	08/02/96
B30		40 39 03	-72 38 32	white 40" roller ball track w/balls	08/02/96
B31		40 39 03	-72 38 32		08/02/96
B32		40 39 03	-72 38 32		08/02/96
B33		40 39 03	-72 38 32		08/02/96
B34		40 39 03	-72 38 32		08/02/96
B35		40 39 03	-72 38 32	cargo ltchdwn;AL 5"x14"trck red latch	08/02/96
B36		40 39 03	-72 38 32		08/02/96
B37		40 39 03	-72 38 32	6"x26" grn strctr; stiffiner 65B38600-36	08/02/96
B38		40 39 03	-72 38 32	1'x1'x1' grn strctr w/12"armature shaft	08/02/96
B39		40 39 03	-72 38 32	6"x20" twisted white like box 6	08/02/96
B40		40 39 03	-72 38 32	linear actuator 747-5700-2-0	08/02/96
B41		40 39 03	-72 38 32		08/02/96
B42		40 39 03	-72 38 32	TWA 14002; see B053	08/02/96
B43		40 39 03	-72 38 32	813/96-85	08/02/96

JUN 10 1998

AS-40
Allmayer

Mr. John King
[redacted] (b)(6)

Mr. Patrick Price (b)(6)
Fax number: [redacted]

Dear Mr. King and Mr. Price:

I am in receipt of your April 15, 1998, fax concerning the National Transportation Safety Board's use of certain technical terms, a statement made by Thomas McSweeney in a 1993 Senate hearing, and the availability of certain technical reports written by Patricia Cahill. We have previously corresponded on each of these topics.

Mr. Price sent me a fax on January 19, 1998, in which he invited me to visit his website. Because information on Mr. Price's website questioned the Safety Board's use of the term "mechanical" to refer to electrical failures, I wrote him on March 10, 1998, explaining the Safety Board's broad use of the term "mechanical." Now, in your April 15, 1998, fax you have asked for my assurance that the Board does not use the term "chaffed wire" to mean eroded insulation. The Safety Board uses the term "chaffed wire" to refer to wire that has been subjected to mechanical damage resulting from contact with fasteners, conduits, or other hardware. The Safety Board uses other technical terms to describe wire that has degraded or has been damaged by other means.

Mr. King sent a fax to me on December 10, 1997, in which he noted that a representative of the Federal Aviation Administration (FAA), Mr. Thomas McSweeney, testified at a 1993 Senate hearing concerning 264 reports of in-flight smoke or fire. Because Mr. King was unable to locate all of these cases in the Safety Board's aircraft accident/incident database, he wrote to ask why they were missing. On January 27, 1998, I wrote Mr. King explaining the differences between the Safety Board's database and other databases maintained by the FAA.

In my March 10, 1998, letter to Mr. Price, I noted that his website contained allegations that the Safety Board had deleted some of the 264 cases from its accident database. In that letter, I assured Mr. Price that the Safety Board does not engage in such conduct, and I suggested that he search a larger database available on the National Aviation Safety Data Analysis Center's website.

In your April 15, 1998, fax you continue to assert that the Safety Board has deleted records from its database. Clearly, my attempts to help you locate information have not been helpful, and there is little reason to believe that a continued dialogue on the topic would satisfy you. I suggest that you contact the FAA directly with any questions you have about Mr. McSweeney's 1993 testimony.

In Mr. King's December 10, 1997, fax he also said that he had failed to locate three specific technical reports authored by Ms. Cahill on the FAA Technical Center's website. The three reports in question are the following:

- Aircraft Electrical Wet-Wire Arc Tracking, 1988, DOT/FAA/CT-88/4;
- Flammability, Smoke, and Dry Arc Tracking Tests, 1989, DOT/FAA/CT-89/21; and
- Electrical Short Circuit and Current Overload Tests on Aircraft Wiring, 1995, DOT/FAA/TN-94/55.

Mr. King further wrote that because of his failed web search, he had concluded that "none of the above three reports exist." I wrote Mr. King on January 27, 1997, to assure him that the Safety Board was well acquainted with Ms. Cahill's research, but your April 15, 1998, fax asserts that the three reports were "deleted" from the Technical Center's library.

A member of my staff called the Technical Center library and discovered that two of the three reports are available from the library (in fact, they are listed on the library's web-based catalog). The first report is not part of the library's collection, but all three reports are available from the National Technical Information Service, which may be reached at 703-605-6000 or on the Internet at http://www.ntis.gov. These technical reports are in the public domain and easily available to anyone who wants them. To suggest that they have been "deleted" or that they "no longer exist" is inaccurate and irresponsible.

Sincerely,

ORIGINAL SIGNED BY
JIM HALL

Jim Hall
Chairman

Mayer; 5/20/98
mc980482
cc: C(2), GA, PA, AS-1, AS-10, AS-40
Proofread by: S. Katz 6/4/98

MEETING PARTICIPANTS AND AFFILIATIONS

(b)(5)

NTSB

✓ 1. Bernard Loeb
✓ 2. Vern Ellingstad
3. John Clark
NO 4. Merritt Birky
5. Ron Schleede
6. Al Dickinson
✓ 7. Tom Haueter
✓ 8. Dennis Crider
9. Dan Bower
✓ 10. Jim Wildey
11. Bob Swaim
12. David Mayer
✓ 13. Karen Bury
✓ 14. Cash, Jim

FAA

1. Bob Breneman
2. Calvin Walbert

Boeing

✓ 1. Kevin Housen
✓ 2. Bernhard Dopker
✓ 3. Jack Winchester
✓ 4. Zack Erblad
✓ 5. Bob Wittington

[redacted]

(b)(5)

[redacted]

Invited Experts

1. Joe Shepherd (Caltech)
2. Julian Lee
✓ 3. Van den Berg (TNO)
✓ 4. Paul Mercx (TNO)
✓ 5. Paul Thibault (Combustion Dynamics Halifax)
6. Kees Wingarden (CMR in Bergen, Norway)
✓ 7. Marty Lentz (WPAFB)
✓ 8. Dennis Jackson (WPAFB)
9. Kevin Sharpe (DERA)
10. Mr. Peal (with Sharpe)
11. Dan Butler (Los Alamos)
12. John MacAfee (Los Alamos)
✓ 13. Naury Birnbaum (Century Dynamics)

Oak Ridge

1. Havey Gray
✓ 2. Tom Zacharia

[redacted]

FBI

1. to be named

(b)(5)

[redacted]

the wire insulation. In addition, the conductivity level of the electrolyte may influence the time and the type of failure (arc track or open circuit) that can occur.

Editors Note: In BENCH tests, fluids commonly found on the aircraft and when collecting on aircraft wiring lead to failure of the wire insulation. Certain commonly used insulations fared less well than others.

REPORT NO. DOT/FAA/CT-89/21
FLAMMABILITY, SMOKE AND DRY ARC TRACKING TESTS OF
AIRCRAFT ELECTRICAL WIRE INSULATIONS
Author Patricia L. Cahill July 1989 Final

Report 21 pages

Sponsoring Agency, FAA Tech Center, Atlantic City, N.J.

Abstract Although three different laboratory-scale tests were evaluated in this wire program, only the sixty-degree test is currently required by the Federal Aviation Administration (FAA). All test specimens with the exception of MIL- W5086/1-PVC nylon passed this test with average burn lengths within the 3-inch maximum and no flame time. The MIL-W-5086/1 samples marginally passed the 30-second flame time, and the average burn length was greater than the 3-inch maxiuum specified specified in the FAR. The smoke test method used in this program called for a straight pilot burner when testing insulated conductor specimens. However, data for multi- directional pilot burner were also included in this report. Large variations in Ds occurred between the two burners for ETFE constructions at both the 5- and 20- minute test points. The MIL-W-81381/21 aromatic polymide and the composite construction (Teflon/ polyimide/ Teflon or TPT showed no appreciable difference in Ds between the two burner types. Moreover, test duration did not affect smoke generation for these two samples. A direct correlation can be seen between dry arc tracking tests and wet wire arc tracking tests (DOT/FAA/CT-88/4). The halogenated polymers formed no conductive chars upon thermal degradation and, therefore, no dry arc tracking. The MIL-W-81381/12 aromatic polyimide sample formed s conductive char upon thermal degradation, and severe arc tracking occurred. Extensive damage to all wires in the bundle occurred due to arc tracking propagation upon circuit breaker resetting. The TPT composite construction performed well. No dry arc tracking was evident. This construction behaved similarly to a halogenated polymer in this respect.

Editors Note: In another series of BENCH tests, certain new types of wire insulation greatly diminished the problem of the effects of arcing - burnt wire insulation, burnt wire bundles and varying degrees of smoke. One type of commonly used insulation greatly exceeded the FAA's own limits. Here, the wire was only held at an angle slightly above and between horizontal and vertical; of course everyone knows that a roll of burning newspaper will burn fastest when held vertical. As in the earlier Cahill tests, WET or DRY - the arc problem PERSISTED in certain older but commonly used wire insulations.

REPORT NO. DOT/FAA/CT-TN94 / 55 ELECTRICAL SHORT CIRCUIT AND CURRENT OVERLOAD TESTS ON AIRCRAFT WIRING
Author Patricia L. Cahill March 1995 Final Report 13 pages

Sponsoring Agency, FAA Tech Center, Atlantic City, N.J.

Abstract

This document describes the electrical short circuit and current overload tests that were conducted on wires used in commercial transport category aircraft. This testing was conducted to evaluate the fire potential that may result from electrical faults. Results of this testing showed that circuit breakers may not protect wire from ticking faults but can protect wire from direct shorts. It also showed that circuit breakers may not safeguard against the ignition of flammable materials by ticking faults. Preliminary testing also indicated that direct short circuits are not likely to start a fire and that direct short circuits do not erode insulation and conductors to the same degree that ticking faults do.

Editors Note

The aircraft internal protection, circuit breakers, did the job well, but largely only for DIRECT short circuits. The more dangerous arcing and resultant insulation fires did NOT reliably trip circuit breakers. An unknowing crew would many times simply reset these breakers and thus greatly INCREASE the chance of wire BUNDLE FIRES. So important was this information about the FIRE potential resulting from electrical faults on transport category aircraft, this Cahill Report, and as an illustration, included three fires that have occurred during the past several years. An excerpted and more brief description of each follows:

----

1. On January 18, 1990. a US Air MD-80, en route to Cleveland from Buffalo, was forced to return to Buffalo when the cockpit filled with smoke from overheated electrical wire insulation. The left generator tripped off-line and the captain turned the right generator control switch to the "Off' position. He selected emergency power and initially was able to clear the smoke. The captain then started the auxiliary power unit (APU) and the cockpit again started to fill with smoke. The A.P.U. electrical power was then shut off and the emergency electrical power was turned back on. The aircraft returned to Buffalo with no further reports of smoke. It was found that the left generator phase B power feeder cable terminal, which is connected to a plastic terminal strip, had melted from intense arcing . The terminal, approximately, 15 inches of the cable, and the terminal stud had melted. The second source of smoke came from a fire started by the molten metal that sprayed an area forward of, and below the terminal strip. The only circuit breaker to trip was the cabin temperature control. This incident was caused by improper torquing of the phase B terminal.

2. On March 17,1991,a Delta L-1011 en route from Frankfurt, Germany, to Atlanta, Georgia, was forced to make an unscheduled landing in Goose Bay, Labrador, Canada. About 7.5 hours into the flight, flames erupted from the base of the left cabin sidewall panel to the height of the seatback tray at the next to last row of passenger seats. The fire was extinguished and a precautionary landing was made. The ignition source of this fire was not determined; however, a possible source of ignition appeared to be an electrical fault. Some of the wires in a fifteen wire bundle located in the fire area exhibited evidence of arcing. Five circuit breakers connected to this wire bundle had tripped.

3. On November 24,1993,an SAS MD-87 experienced smoke and a subsequent fire upon touchdown. The fire damage was severe, including a 1-foot-diameter hole in the skin. Investigation found that two wires, one 115 volts (V) and one 29V, had been pinched together and were arcing to the fuselage structures. Neither the 10-ampere (amp) circuit breaker (28V line) nor the 15-amp circuit breaker (115V line) tripped.

Editors Note; The normal aircraft wire protection, circuit breakers, do not protect against arc tracking and arc track fires. Between 1991 and 1997 ELEVEN other smoke of fire related reports were easily found in the NTSB's accident database at Http://www.ntsb.gov. (CLICK "Site Map", CLICK "Aviation", CLICK "Accident Synopses", CLICK "Select Monthly Lists") The Valujet type fire/smoke reports continue. Consider the following reports from that NTSB database.

NTSB Identification: CHI97IA195. Scheduled 14 CFR 121 operation of NORTHWEST AIRLINES, INC. Incident occurred JUL-05-97 at FLINT, MI. Aircraft: McDonnell Douglas DC-9-30, registration: N963N Injuries: 52 Uninjured.

On July 5, 1997, at 1544 eastern daylight time, a McDonnell-Douglas DC-9-30, operated by Northwest Airlines, Incorporated, as Flight Number 1446, and piloted by an airline transport pilot certified crew, declared an emergency when the cockpit filled with smoke. Instrument meteorological conditions prevailed at the time of the incident. The 14 CFR Part 121 flight was operating on an instrument flight plan. The captain, first officer, two flight attendants, and 48 passengers reported no injuries. The flight departed Milwaukee, Wisconsin, at 1350 central daylight time. Flight 1446 landed at the Bishop International Airport, Flint, Michigan, without incident. The passengers were deplaned through the concourse jetway. According to the captain, he and the first officer noted smoke coming from under the center instrument panel glareshield. The captain said the smoke was billowing out from under the center panel. He said the first officer and he put on their smoke goggles and oxygen masks and proceeded with the emergency checklist. The smoke immediately stopped when the generators were taken off line, according to the captain. He said the cockpit smoke had cleared completely within about 4 minutes. The smoke was confined to the cockpit and did not enter the passenger compartment.

NTSB Identification: FTW97IA227. Nonscheduled 14 CFR 121 operation of SUN COUNTRY AIRLINES (D.B.A. SUNCOUNTRY AIRLINES, INC.) Incident occurred JUN-17-97 at DENVER, CO Aircraft: McDonnell Douglas DC-10-10, registration: N572SC. 24 Uninjured.

On June 17, 1997, at 2009 mountain daylight time, a McDonnell Douglas DC-10-10, N572SC, operated by Sun Country Airlines as flight 1121, made an emergency landing at Denver, Colorado, International Airport after the crew reported smoke in the aircraft. There was no damage to the airplane. Two persons were admitted to Denver General Hospital for observation and released. Visual meteorological conditions prevailed and an IFR flight plan had been filed for the flight conducted under Title 14 CFR Part 121. The flight was a company repositioning flight from Minneapolis, Minnesota, to Los Angeles, California. The flight was carrying 9 flight attendants and 12 deadheading crew members with company material (aircraft parts) and 1795 pounds of mail in the cargo hold. The cockpit crew reportedly donned their masks, as per operating procedure. It is unknown if the passenger oxygen system was activated.

Since 1991, THREE other ValuJet, DC-9 events were also found at the following Month/Day/Years; 2/1/91, 1/1195, 2/20/97. For OTHER type aircraft check - 9/28/91, MD-82, 1/3/92, 737, 4/26/94, 737, 8/13/94, C-130, 6/6/96, Beech 1900, 6/25/96, 767, 10/10/96, DC-10 and 12/11/96, 757.

NTSB DATABASE DELETIONS

The three illustrative events listed in the Cahill 1995 report above were not found ! Neither were the balance of the 264 such events referenced by FAA's Thomas McSweeny during his 1993 Senate testimony (Hearing, 103-397, 11/8/93:, prepared statement of Thomas McSweeny; "We also looked at 264 cases, from 1986 through 1992 that involved smoke, fumes or fire our review disclosed that in none of those cases was the lack of pilot visibility of the instruments or the outside of the aircraft a factor in preventing continued safe flight and landing."

All the above documents plus the testimony to two of our industry wire insulation experts are available now.

John D. King FAA mechanic, lic #[redacted] (b)(6)

Data Validation

- Data updates from floor personel
- Complete paper-to-electronic correlation
  - Target data, diver logs, trawling records and FBI evidence logs
- Data visualization techniques
- Hangar floor audits
- Ad hoc validation studies for pieces of special interest

[redacted]

(b)(5)

Tracking of recovered items

- **Diving operation**
  - Conducted for specific targets
  - Items tagged
  - Over 4,000 tags assigned

- **Trawling operation**
  - Conducted over large search areas
  - Bags tagged, parts numbered
  - Over 885 bags tagged

(b)(5)

[redacted]

[redacted] (b)(5)

Data management

(b)(5) [redacted]

- Supports investigation by maintaining data base of search targets and recovered items
- Search operation produced over 6,400 targets [redacted] (b)(5)
- Recovered items tagged for identification and undersea location information
- Ongoing data validation procedures

(b)(6)

CRC-AVIATION ELECTRICAL DISCHARGES LIAISON GROUP - Page 2

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CRC AVIATION ELECTRICAL DISCHARGES LIAISON GROUP
(Project No. CA-36-61)
July 24, 1996

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Names of Potential Attendees for NTSB Sponsored Meeting
Related to ESD and Ignitable Fuel/Vapor Mixtures

(b)(5)

[redacted]

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(b)(6)

[redacted] Dr Roch short note

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4/w 5-15-97 10:25AM

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Physics Dept.
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Ph. [redacted]

(b)(6)

Mr. Douglas Hale
[redacted]

(b)(6)

(SAY YO-NA-SON)

Dr. Neils Jonassen
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Physics Dept.
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DK 2800 Lyngby, DENMARK
Ph. [redacted]

(b)(6) [redacted]

CALL 1st THING FRI AM.

Mr. Douglas Hale
[redacted]
(b)(6)

(b)(5) [redacted]

MESSAGE CONFIRMATION

11/12/97 15:10
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(b)(6)

FAX

National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza East, S.W.
Washington, D.C. 20594

Date November 12, 1997
Number of pages including cover sheet 10

To: BOB YOUNG
& LINDA KUNZ

Phone
Fax Phone [redacted] (b)(6)
CC:

From: David Mayer

Phone 202-314-6318
Fax Phone 202-314-6309

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Deb Bruce and I have prepared the attached summary of our recent meetings and findings. It will appear as an appendix to the data management report. Please review the summary and provide me with any comments ASAP. Because my report must be finalized quickly, I must receive your comments by close of business Friday, November 14, 1997. Feel free to call if you have any questions.

MESSAGE CONFIRMATION

11/12/97 15:18
ID=NTSB AVIATION SATETY

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127	TX		

DATE/TIME	TIME	DISTANT STATION ID	PAGES	RESULT	ERROR PAGES	S.CODE
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(b)(6)

FAX

National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza East, S.W.
Washington, D.C. 20594

Date November 12, 1997
Number of pages including cover sheet 10

To: Gary Graham

From: David Mayer

Phone
Fax Phone [redacted]
CC:

(b)(6)

Phone 202-314-6318
Fax Phone 202-314-6309

REMARKS:

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FAX

National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza East, S.W.
Washington, D.C. 20594

Date November 12, 1997
Number of pages including cover sheet 10

To: Bob Desantis

Phone
Fax Phone [redacted] (b)(6)
CC:

From: **David Mayer**

Phone **202-314-6318**
Fax Phone **202-314-6309**

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

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FAX

National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza East, S.W.
Washington, D.C. 20594

Date November 12, 1997
Number of pages including cover sheet 10

To: Rocky Miller

From: David Mayer

Phone
Fax Phone [redacted] (b)(6)
CC:

Phone 202-314-6318
Fax Phone 202-314-6309

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Deb Bruce and I have prepared the attached summary of our recent meetings and findings. It will appear as an appendix to the data management report. Please review the summary and provide me with any comments ASAP. Because my report must be finalized quickly, I must receive your comments by close of business Friday, November 14, 1997. Feel free to call if you have any questions.

[redacted]

FAX

National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza East, S.W.
Washington, D.C. 20594

Date November 12, 1997

Number of pages including cover sheet 10

To: Vinnie Cocca ? Through Mike Holm
& Kurt Hobschaidt

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Fax Phone [redacted]
CC:

(b)(6)

From: David Mayer

Phone 202-314-6318
Fax Phone 202-314-6309

REMARKS:

☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Deb Bruce and I have prepared the attached summary of our recent meetings and findings. It will appear as an appendix to the data management report. Please review the summary and provide me with any comments ASAP. Because my report must be finalized quickly, I must receive your comments by close of business Friday, November 14, 1997. Feel free to call if you have any questions.

National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza East, S.W.
Washington, D.C. 20594
U.S.A.

facsimile transmittal

(b)(6)

To:	Rex Parkinson	**Fax:**	[redacted]
From:	David Mayer	**Date:**	April 10, 1997
Re:	Upcoming meeting	**Pages:**	This page only
CC:			

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Message:

On April 18, 1997, The National Transportation Safety Board will hold a meeting to review the progress to date concerning [redacted] and [redacted] Plans for [redacted] and [redacted] will also be reviewed. A number of outside experts from government laboratories and private industry will attend the meeting. The AAIB is welcome to send a representative to this meeting. The meeting will be held at the hangar in Calverton, Long Island, New York. For more information, Please contact Al Dickinson, Investigator in Charge, on 516-369-0451.

(b)(5)

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594-2000
Phone: (202) 314-6300
Fax: (202) 314-6309

DATE: November 19, 1997 **TIME:** 5:30 PM

TO: Linda Kunz

COMPANY: TWA

(b)(6)

PHONE: ____________ **FAX NO.:** [redacted]

FROM: David Mayer

SUBJECT: The Data Management Report

Thanks Again Linda.

My Phone: 202-314-6318

Fax: 202-314-6309

Email: MAYERDA@NTSB.GOV

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NATIONAL TRANSPORTATION SAFETY BOARD

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DATE: November 19, 1997 **TIME:** 5:30 PM

TO: Linda Kunz

COMPANY: TWA (b)(6)

PHONE: ______ **FAX NO.:** [redacted]

FROM: David Mayer

SUBJECT: The Data Management Report